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NCHSR National Health Care Expenditures Study

# Medical Equipment and Supplies: Purchases and Rentals, Expenditures, and Sources of Payment

## Data Preview 10

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# Background of the Study

Examining how Americans use health care services and determining national patterns of health expenditures and insurance coverage are the goals of a landmark study by the National Center for Health Services Research (NCHSR). A major component of NCHSR's Intramural Research Program, the National Health Care Expenditures Study (NHCES) will provide information on a number of critical issues of national health policy. Topics of particular interest to government agencies, legislative bodies, health professionals, and others concerned with health care policies and expenditures include:

- The cost, utilization, and budgetary implications of changes in federal financing programs for health care and of alternatives to the present structure of private health insurance.
- The breadth and depth of health insurance coverage.
- The proportion of health care costs paid by various insurance mechanisms.
- The influence of Medicare and Medicaid programs on the use and costs of medical care.
- How and why Medicaid participation changes over time.
- Patterns of use and expenditures as well as sources of payment for major components of care.
- The cost and effectiveness of different federal, state, and local programs aimed at improving access to care.
- The loss of revenue resulting from current tax treatment of medical and health insurance expenses, particularly with regard to the benefits currently accruing to different categories of individuals and employers, and the potential effects on the federal budget of proposed changes to tax laws.
- How costs of care vary according to diagnostic categories and treatment settings.

The data for these studies were obtained in the National Medical Care Expenditure Survey (NMCES), which has provided the most comprehensive statistical picture to date of how health services are used and paid for in the United States. The survey was completed in September, 1979.

Data were obtained in three separate, complementary stages. About 14,000 randomly selected households in the civilian, noninstitutionalized population were interviewed six times over an 18-month period during 1977 and 1978. This survey was complemented by additional surveys of physicians and health care facilities providing care to household members during 1977 and of employers and insurance companies responsible for their insurance coverage.

Funding for NMCES was provided by NCHSR, which co-sponsored the survey with the National Center for Health Statistics. Data collection for the survey was done by Research Triangle Institute, NC, and its subcontractors, National Opinion Research Center of the University of Chicago, and Abt Associates, Inc., of Cambridge, MA, under contract HRA 230-76-0268. Data processing support was provided by Social and Scientific Systems, Inc. of Washington, D.C., under contracts 233-79-3022 and 233-80-3012.

This report is one of a Data Preview Series that will present estimates of several key measures of health insurance, use, and expenditures for ambulatory services provided by physicians and other health care professionals; inpatient hospital services; dental services; and prescribed medicines.

Even though NMCES was designed to meet specific research goals, NCHSR intends to make the information collected in these surveys available to researchers and other interested persons through public use tapes.

NHCES reports are available from NCHSR, Publications and Information Branch, Room 7-44, 3700 East-West Highway, Hyattsville, MD 20782, 301/436-8970. The graphics and editorial coordinator for this publication series is Maria Friedman.

Additional information on the National Health Care Expenditures Study is available from:

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# Medical Equipment and Supplies: Purchases and Rentals, Expenditures, and Sources of Payment

Michael M. Hagan

Expenses for the purchase or rental of medical equipment and supplies by the civilian noninstitutionalized population of the United States totaled $930 million in 1977. Three-fourths of these expenses were paid by the patients' families out of pocket. Private health insurance paid a relatively small share overall (8.4 percent), and other sources paid 16.7 percent. People 65 years and older, who comprised 10.5 percent of the population in 1977, accounted for about 35 percent of total annual expenditures for medical equipment and supplies.

This data preview from the National Health Care Expenditures Study presents population estimates for this component of health services use, which includes the purchase or rental of wheel chairs, crutches, corrective shoes, supportive devices, hearing aids, syringes, needles, and similar items. Differences among selected population characteristics in the likelihood and frequency of purchases and rentals of medical equipment and supplies are established. The mean charge per purchase and the average proportion of this charge paid by various sources of payment are shown, as well as the distribution of persons by out-of-pocket expenditures for such items. Also, estimates of annual expenditures per person with expense are presented. All findings are from final household data reported for the period January 1 to December 31, 1977, in the National Medical Care Expenditure Survey. (See page 7 for the sources and limitations of these data.)

## Purchases and rentals of medical equipment and supplies

About 13 million people, or 6.2 percent of the population, purchased or rented medical equipment or supplies in 1977 (Table 1), a rate of 93 per 1,000 of the U.S. population. The rate per person with any such purchase or rental was 1.5 items.

Among the population characteristics examined, age was clearly associated with variations in these purchases or rentals. Those 65 years and older were more than twice as likely to have made such purchases or rentals (13.3 percent) than the population as a whole. Rates also increased with age, from roughly 55 per 1,000 population for those in the 6 to 24 year age groups to 129 per 1,000 among those 55 to 64 years and 245 per 1,000 for those 65 years and older.

Whites were roughly twice as likely as blacks and Hispanics to have purchased or rented any medical equipment or supplies, with a twofold difference in rates per 1,000 population. Those not in the labor force and people in the North Central and Western regions of the country also had higher rates per 1,000 population than the national rate. However, rates per person with any purchases or rentals of medical equipment or supplies were comparable.

## Charges and sources of payment

The mean charge for medical equipment and supplies was $48 (Table 2). Overall, the family paid by far the largest proportion of this (0.83) out of pocket; private health insurance paid 0.08 and other sources paid 0.09 of the mean charge.

Mean charges for medical equipment and supplies again varied by age and ethnic/racial background. Those 55 years or older and persons not

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in the labor force paid roughly $60 for each purchase or rental. Mean charges for whites ($44) were well below those for blacks and Hispanics ($74 and $97, respectively).

In terms of statistically significant differences, there was little variation in the proportion paid by the family according to the population characteristics shown. The proportion of the mean charge paid by sources of payment other than the family and private health insurance was higher than the population average of 0.09 for persons 65 years and older (0.16); for persons in families with incomes less than $12,000 (0.14); and for people not in the labor force (0.14).

### Annual out-of-pocket expenses

Among the 6.2 percent of the population who obtained medical equipment or supplies in 1977, about two-thirds spent either nothing or less than $25 out of pocket (Table 3). Those 65 years and older were an exception. They were not only twice as likely to have obtained such items (see Table 1), but over twice as likely as the rest of the population to have spent more than $25, and four times as likely as those 25 to 54 years of age to have had out-of-pocket expenses exceeding $100. Among other population groups, there were no substantial differences from the total population estimates in the distribution of out-of-pocket expenses for this component of health expenditures.

### Annual expenditures

Expenditures in 1977 for medical equipment and supplies obtained by roughly 13 million people totaled $930 million, for an average annual expenditure of $72 per person with purchases or rentals. The family assumed nearly three-fourths of these expenditures; 8.4 percent was paid by private health insurance, and 16.7 percent by other sources of payment. The families of individuals 65 years or older also paid about three-fourths of mean annual expenses (73.8 percent). However, they paid a considerably higher amount in dollars than the average family share ($81.92 compared to $53.93) because of the high expenditures of persons in the oldest age group ($111 compared to a national mean of $72). Similarly, those not in the labor force had average annual expenditures of $99, $72 of which were paid by the family. In comparison, expenditures among the employed were $58, of which $45 were paid by the family out of pocket.

The difference between the proportion of the mean charge for each purchase or rental (Table 2) and the percent of annual expenditures (Table 4) assumed by the family may be attributed to two factors: the methods of calculation used (see page 7) and the greater likelihood of reimbursement for expensive items, including wheel chairs, by such sources of payment as Medicare and Medicaid.

**Table 1. Medical equipment and supplies[a]: Percent of persons with and without purchase or rentals of medical equipment and supplies and means per 1,000 population and per person with at least one purchase or rental, by selected population characteristics.** *NMCES household data: United States, 1977.*

| Population characteristics | Total population (in thousands) | Persons without purchase or rental | Persons with at least one purchase or rental | Purchases or rentals per 1,000 population | Purchases and rentals per person with purchase or rental |
|---|---|---|---|---|---|
| | | Percent | | | Mean |
| Total[b,c,d,e] | 212,098 | 93.8 | 6.2 | 93 | 1.5 |
| **Age in years** | | | | | |
| Less than 6 | 18,216 | 95.5 | 4.5 | 67 | 1.5 |
| 6 to 18 | 50,647 | 95.8 | 4.2 | 55 | 1.3 |
| 19 to 24 | 22,299 | 95.5 | 4.5 | 56 | 1.3 |
| 25 to 54 | 78,472 | 94.2 | 5.8 | 82 | 1.4 |
| 55 to 64 | 20,180 | 91.5 | 8.5 | 129 | 1.5 |
| 65 or older | 22,284 | 86.7 | 13.3 | 245 | 1.8 |
| **Sex** | | | | | |
| Male | 102,602 | 93.9 | 6.1 | 90 | 1.5 |
| Female | 109,496 | 93.7 | 6.3 | 96 | 1.5 |
| **Ethnic/racial background** | | | | | |
| White | 147,239 | 92.9 | 7.1 | 101 | 1.4 |
| Black | 19,573 | 96.7 | 3.3 | 44 | 1.4 |
| Hispanic | 8,821 | 96.1 | 3.9 | 55 | 1.4 |
| **Family income** | | | | | |
| Less than $12,000 | 74,816 | 93.5 | 6.5 | 103 | 1.6 |
| $12,000 to $19,999 | 55,970 | 93.8 | 6.2 | 92 | 1.5 |
| $20,000 or more | 80,718 | 94.1 | 5.9 | 85 | 1.5 |
| **Education of family head** | | | | | |
| Less than 9 years | 41,295 | 93.4 | 6.6 | 108 | 1.6 |
| 9 to 11 years | 33,679 | 94.6 | 5.4 | 87 | 1.6 |
| 12 years | 67,505 | 94.2 | 5.8 | 83 | 1.4 |
| 13 to 15 years | 27,906 | 93.1 | 6.9 | 98 | 1.4 |
| 16 or more years | 32,345 | 92.5 | 7.5 | 109 | 1.5 |
| **Employment status** | | | | | |
| Employed | 89,077 | 93.9 | 6.1 | 85 | 1.4 |
| Unemployed | 5,865 | 94.2 | 5.8 | 73 | 1.3 |
| Not in labor force | 69,920 | 92.0 | 8.0 | 133 | 1.7 |
| **Place of residence** | | | | | |
| SMSA | 147,419 | 93.7 | 6.3 | 96 | 1.5 |
| Other | 64,679 | 94.0 | 6.0 | 87 | 1.4 |
| **U.S. Census region** | | | | | |
| Northeast | 47,137 | 94.3 | 5.7 | 88 | 1.6 |
| North Central | 58,039 | 92.8 | 7.2 | 105 | 1.5 |
| South | 67,357 | 94.8 | 5.2 | 78 | 1.5 |
| West | 39,565 | 92.8 | 7.2 | 105 | 1.5 |

[a]Wheel chairs and crutches, corrective shoes, supportive devices, hearing aids and supplies, syringes, needles, and similar items. [b]Includes all other ethnic/racial groups not shown separately. [c]Includes persons with negative income. [d]Includes persons with unknown education. [e]Includes all those not in the labor force but less than 14 years of age. **Source: National Center for Health Services Research.**

**Table 2. Charges and sources of payment for medical equipment and supplies: Mean charge per purchase or rental and proportion paid by different sources of payment.** *NMCES household data: United States, 1977.*

| Population characteristics | Total purchases or rentals with charge (in thousands) | Mean charge per purchase or rental | Source of payment | | |
|---|---|---|---|---|---|
| | | | Family | Private health insurance | Other[a] |
| | | ($) | Average proportion paid | | |
| Total[b,c,d,e] | 19,434 | 48 | 0.83 | 0.08 | 0.09 |
| **Age in years** | | | | | |
| Less than 6 | 1,216 | 29 | 0.85 | *0.09 | *0.07 |
| 6 to 18 | 2,700 | 22 | 0.86 | *0.09 | *0.05 |
| 19 to 24 | 1,171 | 21 | 0.86 | *0.09 | *0.05 |
| 25 to 54 | 6,353 | 50 | 0.80 | 0.13 | 0.08 |
| 55 to 64 | 2,591 | 63 | 0.87 | *0.07 | *0.06 |
| 65 or older | 5,403 | 60 | 0.82 | *0.02 | 0.16 |
| **Sex** | | | | | |
| Male | 9,004 | 43 | 0.81 | 0.07 | 0.11 |
| Female | 10,430 | 48 | 0.82 | 0.09 | 0.09 |
| **Ethnic/racial background** | | | | | |
| White | 14,611 | 44 | 0.83 | 0.09 | 0.08 |
| Black | 858 | 74 | 0.77 | *0.07 | *0.16 |
| Hispanic | 481 | 97 | 0.69 | *0.15 | *0.17 |
| **Family income** | | | | | |
| Less than $12,000 | 7,543 | 55 | 0.82 | 0.05 | 0.14 |
| $12,000 to $19,999 | 5,057 | 48 | 0.86 | 0.07 | 0.07 |
| $20,000 or more | 6,747 | 39 | 0.83 | 0.12 | 0.06 |
| **Education of family head** | | | | | |
| Less than 9 years | 4,446 | 52 | 0.81 | 0.07 | 0.13 |
| 9 to 11 years | 2,825 | 54 | 0.81 | *0.05 | 0.14 |
| 12 years | 5,500 | 45 | 0.82 | 0.11 | 0.07 |
| 13 to 15 years | 2,649 | 63 | 0.87 | *0.06 | *0.07 |
| 16 or more years | 3,499 | 30 | 0.86 | *0.07 | *0.07 |
| **Employment status** | | | | | |
| Employed | 7,366 | 42 | 0.84 | 0.11 | 0.04 |
| Unemployed | 390 | – | – | – | – |
| Not in labor force | 9,152 | 59 | 0.80 | 0.05 | 0.14 |
| **Place of residence** | | | | | |
| SMSA | 13,895 | 48 | 0.82 | 0.08 | 0.10 |
| Other | 5,539 | 47 | 0.86 | 0.07 | 0.07 |
| **U.S. Census region** | | | | | |
| Northeast | 4,127 | 51 | 0.80 | 0.08 | 0.11 |
| North Central | 6,052 | 48 | 0.84 | 0.09 | 0.07 |
| South | 5,217 | 46 | 0.85 | 0.07 | 0.08 |
| West | 4,038 | 44 | 0.82 | *0.06 | 0.12 |

[a]Includes Medicare, Medicaid, CHAMPUS, CHAMPVA, the Indian Health Service, the Veterans Administration, the military, other federal, state, city or county payers, philanthropic institutions, and unknown sources of payment. [b]Includes all other other ethnic/racial groups not shown separately. [c]Includes persons with negative income. [d]Includes persons with unknown education. [e]Includes persons not in the labor force but less than 14 years of age. –The sample cell size was not large enough to estimate the population figure. *Relative standard error is equal to or greater than 30 percent. **Source: National Center for Health Services Research.**

**Table 3. Out-of-pocket expenses for medical equipment and supplies: Percent distribution of persons with and without purchase or rental of medical equipment and supplies, by intervals of out-of-pocket expense.** *NMCES household data: United States, 1977.*

| Population characteristics | Total population (in thousands) | Out-of-pocket expense | | | | No purchase or rental |
|---|---|---|---|---|---|---|
| | | None | $1–$24 | $25–$99 | $100–or more | |
| | | Percent distribution | | | | |
| Total[a,b,c,d] | 212,098 | 0.9 | 3.1 | 1.7 | 0.5 | 93.8 |
| **Age in years** | | | | | | |
| Less than 6 | 18,216 | *0.6 | 2.1 | 1.7 | *0.1 | 95.5 |
| 6 to 18 | 50,647 | 0.6 | 2.5 | 1.0 | *0.1 | 95.8 |
| 19 to 24 | 22,299 | 0.9 | 2.3 | 1.2 | *0.1 | 95.5 |
| 25 to 54 | 78,472 | 1.2 | 2.9 | 1.5 | 0.5 | 94.2 |
| 55 to 64 | 20,180 | 1.0 | 4.1 | 2.3 | 1.2 | 91.5 |
| 65 or older | 22,284 | 1.5 | 6.0 | 3.8 | 2.0 | 86.7 |
| **Sex** | | | | | | |
| Male | 102,602 | 1.0 | 3.0 | 1.5 | 0.6 | 93.9 |
| Female | 109,496 | 0.8 | 3.1 | 3.9 | 0.5 | 93.7 |
| **Ethnic/racial background** | | | | | | |
| White | 147,239 | 1.0 | 3.7 | 1.9 | 0.6 | 92.9 |
| Black | 19,573 | *0.7 | 1.5 | *0.8 | *0.3 | 96.7 |
| Hispanic | 8,821 | *1.1 | *1.4 | *1.0 | *0.5 | 96.1 |
| **Family income** | | | | | | |
| Less than $12,000 | 74,816 | 1.1 | 3.2 | 1.6 | 0.6 | 93.5 |
| $12,000 to $19,999 | 55,970 | 0.8 | 3.0 | 1.8 | 0.6 | 93.8 |
| $20,000 or more | 80,718 | 0.8 | 3.0 | 1.7 | 0.4 | 94.1 |
| **Education of family head** | | | | | | |
| Less than 9 years | 41,295 | 1.0 | 3.2 | 1.6 | 0.8 | 93.4 |
| 9 to 11 years | 33,679 | 1.1 | 2.3 | 1.5 | *0.5 | 94.6 |
| 12 years | 67,505 | 0.8 | 2.9 | 1.6 | 0.5 | 94.2 |
| 13 to 15 years | 27,906 | 0.8 | 3.6 | 1.9 | *0.6 | 93.1 |
| 16 or more years | 32,345 | 0.7 | 4.1 | 2.1 | *0.5 | 92.5 |
| **Employment status** | | | | | | |
| Employed | 89,077 | 0.9 | 3.1 | 1.6 | 0.4 | 93.9 |
| Unemployed | 5,865 | *1.2 | *2.8 | *1.4 | *0.4 | 94.2 |
| Not in labor force | 69,920 | 1.2 | 3.8 | 2.1 | 1.0 | 92.0 |
| **Place of residence** | | | | | | |
| SMSA | 147,419 | 1.0 | 3.1 | 1.8 | 0.5 | 93.7 |
| Other | 64,679 | 0.8 | 3.1 | 1.5 | 0.6 | 94.0 |
| **U.S. Census region** | | | | | | |
| Northeast | 47,137 | 0.9 | 2.7 | 1.7 | 0.5 | 94.3 |
| North Central | 58,039 | 1.2 | 3.8 | 1.6 | 0.6 | 92.8 |
| South | 67,357 | 0.6 | 2.5 | 1.5 | 0.5 | 94.8 |
| West | 39,565 | 1.2 | 3.4 | 2.0 | 0.6 | 92.8 |

[a]Includes all other ethnic/racial groups not shown separately. [b]Includes persons with negative income. [c]Includes persons with unknown education. [d]Includes those not in the labor force but less than 14 years of age. *Relative standard error is equal to or greater than 30 percent.
**Source: National Center for Health Services Research.**

**Table 4. Annual expenditures and sources of payment for medical equipment and supplies: Mean expense per person with expense and percent paid by source of payment.** *NMCES household data: United States, 1977.*

| Population characteristics | Total population with expense (in thousands) | Mean expense per person with expense | Source of payment | | |
|---|---|---|---|---|---|
| | | | Family | Private health insurance | Other[a] |
| | | $ | Percent distribution | | |
| Total[b,c,d,e] | 12,919 | 72 | 74.9 | 8.4 | 16.7 |
| **Age in years** | | | | | |
| Less than 6 | 813 | 44 | 71.6 | 18.0 | 10.4 |
| 6 to 18 | 2,075 | 29 | 80.0 | 13.3 | 6.6 |
| 19 to 24 | 934 | 27 | 79.2 | 10.6 | 10.3 |
| 25 to 54 | 4,469 | 70 | 72.8 | 12.0 | 15.2 |
| 55 to 64 | 1,694 | 97 | 79.1 | 9.6 | 11.3 |
| 65 or older | 2,933 | 111 | 73.8 | 2.2 | 24.0 |
| **Sex** | | | | | |
| Male | 6,141 | 70 | 74.2 | 9.7 | 16.1 |
| Female | 6,778 | 73 | 75.5 | 7.3 | 17.2 |
| **Ethnic/racial background** | | | | | |
| White | 10,244 | 62 | 73.5 | 10.0 | 16.5 |
| Black | 629 | 101 | 61.5 | *3.1 | 35.4 |
| Hispanic | 345 | — | — | — | — |
| **Family income** | | | | | |
| Less than $12,000 | 4,766 | 87 | 74.7 | 5.4 | 19.9 |
| $12,000 to $19,999 | 3,383 | 71 | 80.2 | 6.2 | 13.6 |
| $20,000 or more | 4,716 | 56 | 70.3 | 15.1 | 14.6 |
| **Education of family head** | | | | | |
| Less than 9 years | 2,694 | 86 | 66.9 | 6.7 | 26.4 |
| 9 to 11 years | 1,747 | 87 | 66.6 | 8.7 | 24.7 |
| 12 years | 3,855 | 65 | 76.3 | 9.0 | 14.7 |
| 13 to 15 years | 1,893 | 88 | 88.8 | 7.4 | 3.8 |
| 16 or more years | 2,399 | 44 | 81.3 | 8.1 | 10.7 |
| **Employment status** | | | | | |
| Employed | 5,286 | 58 | 78.0 | 13.9 | 8.1 |
| Unemployed | 315 | — | — | — | — |
| Not in labor force | 5,522 | 99 | 73.0 | 4.4 | 22.6 |
| **Place of residence** | | | | | |
| SMSA | 9,086 | 73 | 74.7 | 8.0 | 17.3 |
| Other | 3,833 | 68 | 75.4 | 9.5 | 15.1 |
| **U.S. Census region** | | | | | |
| Northeast | 2,633 | 80 | 76.6 | 7.6 | 15.8 |
| North Central | 4,078 | 72 | 77.0 | 11.5 | 11.5 |
| South | 3,417 | 71 | 70.6 | 7.0 | 22.4 |
| West | 2,791 | 64 | 75.1 | 6.3 | 18.6 |

[a]Includes Medicare and Medicaid, CHAMPUS, CHAMPVA, the Indian Health Service, the Veterans Administration, the military, other federal, state, city or county payers, philanthropic institutions, and unknown sources of payment. [b]Includes other ethnic/racial groups not shown separately. [c]Includes persons with negative income. [d]Includes persons with unknown education. [e]Includes all those not in the labor force but less than 14 years of age. —The sample cell size was not large enough to estimate the population figure. *Relative standard error is equal to or greater than 30 percent. **Source: National Center for Health Services Research**

# Sources and Limitations of the Data

The data in this report were obtained in the major survey component of the National Medical Care Expenditure Survey (NMCES). In five rounds of household interviews, data were elicited on the use of and expenditures for health services. The survey reference period was January 1 to December 31, 1977. For the interview instruments, *see NHCES Instruments and Procedures 1* (Bonham and Corder, 1981). Information supplied by the respondent was amended in each round through the household summary update process, which allowed the respondent to correct or add to the information provided in previous interviews. Trained interviewers then updated a computer-generated summary of both expenditures and sources of payment for health care previously reported by the respondent. In the fifth interview, respondents reviewed with the interviewer each reported event of health care shown in the household summary.

### Imputation of missing data

For approximately 7 percent of all purchases or rentals of medical equipment and supplies in the sample, data on charges remained missing or incomplete; data on sources of payment were missing for approximately 5 percent. These data were imputed using a method developed at the U.S. Bureau of the Census for their *Current Population Reports* series.

This procedure imputes data for individuals with complete information to individuals with missing data but similar characteristics. Variables with known values for all individuals in the survey (e.g., age, U.S. Census region) were used to form groups of donors with known data on purchases or rentals of medical equipment and supplies, charges, and sources of payment and identical groups of recipients with missing data. Within such groups, data were randomly assigned from donors to recipients.

### Flat fees and equipment without charge

Flat fees are single charges for a series of purchases or rentals of equipment and supplies, including repairs or adjustments. For the approximately 3.2 percent of these instances in the sample, separate charges were subsequently calculated by dividing the total flat fee charge by the number of associated purchases or rentals.

Medical equipment and supplies provided without charge, either because they were free from the provider or obtained from a prepaid group practice, are included in the estimates in Tables 1 and 3 but omitted from the estimates on charges and expenditures in Tables 2 and 4. These amounted to approximately 0.1 percent of all purchases or repairs of medical equipment and supplies.

### Sources of payment

The share borne by each source of payment of the total charge per item of use or event of care is expressed as a proportion to emphasize that the unit of analysis is the average charge and not the respective percent of items or events paid by different sources of payment. This proportion was calculated by dividing the amount paid by the total charge for each item or event and then averaging this value over all items or events. The share of total annual expense per person with expense borne by different sources of payment is expressed as a percent and is calculated by summing all payments by a specific source and dividing them by total expenditures. Also, averages given for the respective sources do not reflect actual patterns of payment. For example, Medicaid usually pays either all or none of a specific charge.

Where the sum of percents reported for several sources of payment exceeded 100 per item, the amounts paid by the family out of pocket were reduced to make the sum of percents paid by all sources equal to 100 percent. If the sum of percents reported paid by all sources was less than 100 percent per item, the remainder was assigned to the "other" source of payment category.

### Population characteristics

*Family income.* Incomes as reported for each member of the family during round 5 were summed across income types and family members to yield measures of total annual gross family income. The results approximated data from the March 1977 *Current Population Survey* of the U.S. Census Bureau on total income per family and the percent distribution of persons and families by categories of family income.

*Employment status.* Employment status was based on round 5 household reports. Persons were defined as employed if they worked for pay for the week preceding the round 5 interview. Persons were defined as unemployed if they had not worked for pay during the week before the round 5 interview, were not full-time students, and were either laid off or looking for work. Persons not in the labor force included all civilians 14 years or older not classified as employed or unemployed by these definitions. The sample was categorized to match population data from the Bureau of Labor Statistics on the percent distribution of persons 16 years of age or older by employment status for December 1977.

*Race/Ethnicity.* Classification by racial/ethnic origin was developed from a series of questions asked in the round 5 interview. Persons 17 years of age or older were asked if their racial background were best described as American Indian or Alaskan Native; Asian or Pacific Islander; black; white; or other. They also were asked if their main national origin or ancestry was among one of the following:

- Puerto Rican
- Cuban
- Mexican
- Mexicano
- Mexican-American
- Chicano
- Other Latin American
- Other Spanish

All persons who claimed main national origin or ancestry in one of these groups were classified as Hispanic, regardless of racial background. Other persons were then classified as white, black, or other depending on their reported racial background.

These classifications were extended to the under 17 population based on family relationship codes. Persons who dropped out of the survey prior to round 5 are coded as unknown.

### Definition of Terms

*Medical equipment and supplies:* Wheel chairs or crutches, corrective shoes, supportive devices, hearing aids, syringes, needles, and similar items.

*Annual expenditures:* The sum of charges for purchases or rentals of medical equipment and supplies during the period January 1, 1977 to December 31, 1977.

*Out-of-pocket expense:* The sum of annual expenditures paid by the family.

# Technical Notes

### Sample design

The survey sample was designed to produce statistically unbiased national estimates that are representative of the civilian noninstitutionalized population of the United States. To this end, the study used the national multistage area samples of the Research Triangle Institute and the National Opinion Research Center. Sampling specifications required the selection of about 14,000 households. Data were obtained for about 91 percent of eligible households in the first interview and 82 percent by the fifth interview. Approximately 11 percent of all survey participants provided data for only some of the time in which they were eligible to respond. Information for these respondents was adjusted to account for this partial nonresponse (Cohen, 1981). For a detailed description of the survey sample and of sampling, estimation, and adjustment methods, including weighting for nonresponse and poststratification, *see* Cohen and Kalsbeek, 1981.

### Reliability of estimates

Since the statistics presented in this report are based on a sample, they may differ somewhat from the figures that would have been obtained if a complete census had been taken. This potential difference between sample results and a complete count is the sampling error, which is measured by a statistic called the standard error of the estimate.

The chance that an estimate from the sample would differ from a complete census by less than one standard error is about 68 out of 100. The chance that the difference between the sample estimate and a complete census would be less than twice the standard error is about 95 out of 100.

Tests of statistical significance were used to determine whether differences between population estimates exist at specified levels of confidence or whether they simply occurred by chance. Differences were tested using Z-scores having asymptotic normal properties, based on the rounded figures at the 0.05 level of significance. Unless otherwise noted, only statistically significant differences between estimates are discussed in the text.

It should be noted that the NMCES sample size and the variation in the amount paid by certain sources for medical equipment and supplies constrain the interpretation of these estimates for some of the specific population groups. For example, for some of the estimates of sources of payment shown in Table 2, the relative standard error was at least 30 percent, which indicates that the proportion of the charge paid in 1977 may have been at least 30 percent higher or lower than that shown.

### Estimated standard errors

Standard errors for the statistics presented in this paper were approximated, by interpolation where necessary, using a curve smoothing procedure developed at the National Center for Health Services Research (Cohen, 1979).

#### *Relative standard errors*

*Totals:* Where the statistics of interest are total estimates (T) of the population, of purchases or rentals of medical equipment and supplies, or of expenditures, an estimate of the standard error, SE, can be obtained by multiplying the relative standard error, expressed as a percent, of the respective T, RSE(T), by T, and then dividing by 100. Thus,

$$SE(T) = \frac{T[RSE(T)]}{100}$$

For estimated population totals, the approximate relative standard errors expressed as percent are as follows:

**Table I**

| Estimated population totals (in thousands) | Relative standard error (%) |
|---|---|
| 500 | 18.9 |
| 1,000 | 13.5 |
| 2,500 | 8.7 |
| 5,000 | 6.4 |
| 10,000 | 4.8 |
| 25,000 | 3.5 |
| 50,000 | 3.0 |
| 100,000 | 2.6 |
| 200,000 | 2.4 |

*Example:* An estimate of 13 million persons in the U.S. population with at least one purchase or rental of medical equipment and supplies (212,098,000 x .062, Table 1) has a relative standard error of between 3.5 and 4.8 percent (Table I) or, by interpolation, a relative standard error of about 4.5. The standard error of this estimate, then, is

$$SE(T) = \frac{13{,}000{,}000(4.5)}{100} = 585{,}000.$$

For the estimated number of purchases and rentals, the approximate relative standard errors expressed as percent are as follows:

**Table II**

| Estimates of purchases and rentals of medical equipment and supplies (in thousands) | Relative standard error (%) |
|---|---|
| 500 | 11.2 |
| 1,000 | 9.2 |
| 2,500 | 7.8 |
| 5,000 | 7.2 |
| 10,000 | 6.9 |
| 25,000 | 6.7 |
| 50,000 | 6.7 |
| 100,000 | 6.6 |
| 250,000 | 6.6 |
| 500,000 or above | 6.6 |

For the estimated expenditures for medical equipment and supplies, the approximate relative standard errors expressed as percent are as follows:

**Table III**

| Estimate of expenditures (in thousands) | Relative standard error (%) |
|---|---|
| $ 25,000 | 15.2 |
| 50,000 | 14.5 |
| 100,000 | 14.2 |
| 250,000 | 13.9 |
| 500,000 | 13.9 |
| 1,000,000 | 13.8 |

*Ratios:* When the statistic of interest is a ratio, Y, such as a rate, mean or percent, both the relative standard error of the numerator, RSE(N), and the relative standard error of the denominator, RSE(D), must be considered. Thus, Y = N/D, and the standard error of Y is:

$$SE(Y) = Y \frac{\sqrt{RSE(N)^2 + RSE(D)^2}}{100}$$

$$Y = \frac{\text{number of purchases or rentals}}{\text{number of population or persons with purchases or rentals}}$$

for the mean number of purchases or rentals per population or person with purchases or rentals;

$$Y = \frac{\text{sum total of charges}}{\text{number of purchases or rentals with charge}}$$

for the mean charge per purchase or rental;

$$Y = \frac{\text{total expenditures}}{\text{persons with expense}}$$

for mean expense per person with expense;

$$Y = \frac{\text{total paid by source}}{\text{total expenditures}}$$

for the percent of expenses attributed to each source of payment.

*Example:* For the standard error of the mean expense for medical equipment per person with expense ($72; Table 4), the relative standard error of the numerator, SE(N), is 13.8 percent (12,919,000 persons with expense x $72 = $930 million, Table III); and the relative standard error of the denominator is approximately 4.5 (Table I). Then the standard error is:

$$SE(\$72) = \$72 \frac{\sqrt{(13.8)^2 + (4.5)^2}}{100} = \$10.45$$

*Direct standard error estimates*

When the statistic of interest is expressed as a person or event based measure, direct estimates of standard errors have been derived for ease of calculation. For the estimated percent of persons with or without at least one event involving medical equipment and supplies, approximate standard errors expressed as percent are shown in Table IV. For the estimated proportion of the purchase or rental charge paid by each source of payment, approximate standard errors expressed as a proportion are shown in Table V.

**Rounding**

Estimates as presented in the tables are rounded to the nearest tenth of a percent or proportion and to the nearest dollar.

**Table IV**

| Persons in the base of the percent (in thousands) | Estimated percent | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2 or 98 | 5 or 95 | 10 or 90 | 20 or 80 | 30 or 70 | 40 or 60 | 50 |
| | Approximate standard error (in percent) | | | | | | |
| 1,000 | 1.9 | 2.9 | 4.0 | 5.3 | 6.1 | 6.5 | 6.6 |
| 2,500 | 1.2 | 1.8 | 2.5 | 3.4 | 3.8 | 4.1 | 4.2 |
| 5,000 | 0.8 | 1.3 | 1.8 | 2.4 | 2.7 | 2.9 | 3.0 |
| 10,000 | 0.6 | 0.9 | 1.3 | 1.7 | 1.9 | 2.1 | 2.1 |
| 25,000 | 0.4 | 0.6 | 0.8 | 1.1 | 1.2 | 1.3 | 1.3 |
| 50,000 | 0.3 | 0.4 | 0.6 | 0.8 | 0.9 | 0.9 | 0.9 |
| 100,000 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.7 |
| 200,000 | 0.1 | 0.2 | 0.3 | 0.4 | 0.4 | 0.5 | 0.5 |

*Example:* The estimate of 6.2 percent of the U.S. population with at least one purchase or rental of medical equipment and supplies in 1977 is based on a population total of 212,098,000 (Table 1). This estimate has a standard error of approximately 0.2 percent.

**Table V**

| Number of purchases or rentals in the base of the average proportion (in thousands) | Estimated proportion | | | | | | |
|---|---|---|---|---|---|---|---|
| | .02 or .98 | .05 or .95 | .10 or .90 | .20 or .80 | .30 or .70 | .40 or .60 | .50 |
| | Approximate standard error (in proportion) | | | | | | |
| 1,000 | .022 | .035 | .046 | .061 | .070 | .075 | .077 |
| 2,500 | .014 | .021 | .029 | .039 | .045 | .048 | .049 |
| 5,000 | .009 | .015 | .021 | .027 | .031 | .034 | .034 |
| 10,000 | .007 | .011 | .015 | .019 | .022 | .024 | .024 |
| 25,000 | .004 | .007 | .009 | .013 | .014 | .015 | .015 |
| 50,000 | .003 | .005 | .007 | .009 | .010 | .011 | .011 |
| 100,000 | .002 | .003 | .005 | .006 | .007 | .008 | .008 |
| 250,000 | .001 | .002 | .003 | .004 | .004 | .005 | .005 |
| 500,000 | .001 | .001 | .002 | .003 | .003 | .003 | .003 |

# References

Bonham, G.S. and L.S. Corder. *National Health Care Expenditures Study, Instruments and Procedures 1: NMCES Household Interview Instruments,* DHHS Publication No. (PHS) 81-3280. U.S. Department of Health and Human Services, National Center for Health Services Research, 1981.

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# Available NHCES Publications

**NHCES Data Preview 1: Who Are the Uninsured?** One surprise of this study was the large number of persons who reported being uninsured -- 26.6 million persons or about 12.6 percent of the civilian population. (This excludes persons serving in the armed forces and residents of nursing homes, prisons, and long-term psychiatric hospitals.) The study also showed that in 81.4 percent of U.S. families, every member was covered by some type of insurance from January to March 1977. There were no differences in insurance coverage between men and women, but there were variations according to age, color, and geographic groups. Of six age groups studied, persons 18 to 24 were most likely to be without coverage. In this group, 21.9 percent of all persons lacked coverage. A large difference was noted in coverage between whites and all other races. Twelve percent of whites were found to be without coverage compared with 18 percent of all other races. Persons with relatively few years of education were more likely to be without coverage: 15.5 percent of those with less than 12 years of education (and over 17 years old) had no coverage, compared with 12.1 percent of high school graduates and 8.9 percent of persons who had 13 or more years of education. Urban populations had greater coverage than rural ones, with 18 percent of rural residents lacking coverage while only 10.4 percent of those living in the 16 largest urban areas were not covered.

**NHCES Data Preview 2: Charges and Sources of Payment for Dental Visits with Separate Charges.** In a survey of dental visits during the first quarter of 1977, for which a separate charge was made for each visit, the average cost of the visit was reported to be $31.71, of which 77 percent was paid by the patient or his family. Private health insurance paid 13 percent of the charge and 10 percent was paid by public sources such as Medicaid. Payment for more than 90 percent of all dental visits came from only one source. Among age groups, the average charge for dental visits was $35.60 for adults 20 to 44 and $22.31 for children 12 or younger. Generally, the proportion of the dental bill paid by the family increased as the patient grew older. The lowest proportion of the bill paid by the family was for children 12 or under -- 67 percent; persons 45 to 64 paid 83 percent of the bill; and those 65 and older paid 93 percent. There were no significant differences between the average bill received by whites and all other races, but the average proportion of those bills paid by private health insurance did vary significantly. Whites paid 78 percent of the bill, while all others paid 61 percent. A large proportion of charges for the latter group was paid by public sources. The average charge for dental visits did not vary significantly with the education of the patient. However, the average proportion paid by the family increased with the education level, from 72 percent for persons with 11 years of education or less to 80 percent for persons with 12 years; and 85 percent for those with 13 years or more.

**NHCES Data Preview 3: Who Initiates Visits to a Physician?** Since a physician's income is influenced by how often patients are seen, the question of who initiates a visit to a physician is an important one. This Data Preview looks at how often visits to the doctor were initiated by physicians and by patients during the first three months of 1977. The medical appropriateness of the visits was not taken into account. Results indicate that about 60 percent of the visits were initiated by patients, while about 36 percent were initiated by physicians by making an appointment with the patient during a previous visit. As the age of the patient increased, physician-initiated visits increased. Only 23 percent of visits were physician-initiated for children up to age 18. For persons in the 55- to 64-year age group, about 46 percent of the visits were initiated by a physician. There were no statistical differences in the percentage of physician-initiated visits with respect to sex, color, or education. The percentage of physician-initiated visits rose with the density of physicians in a state. For states with less than 100 physicians per 100,000 persons, 31.1 percent of the visits were initiated by physicians; for states with 175 or more physicians per 100,000 persons, 39.6 percent of the visits were initiated by physicians. In the physician's office, 36.3 percent of the visits were initiated by the physician, with 59.8 percent initiated by the patient. In hospital outpatient clinics, 50.7 percent of the visits were initiated by the physician, with 44.8 percent initiated by the patient; in hospital emergency rooms, 89.2 percent of the visits were initiated by the patient and 6.2 percent by the physician.

**NHCES Data Preview 4: Health Insurance Coverage of Veterans.** During the first quarter of 1977, slightly more than 11 percent of veterans, or about three million men 20 years or older, were uninsured compared with 14.5 percent of men in the general population. The exception to veterans' relatively high level of insurance coverage was the youngest age group -- 20 to 25 years of age -- in which 34.6 percent were found to be uninsured compared to 24.0 percent of men who had not served in the armed forces. Three-quarters of veterans had private health insurance compared to about 64 percent of men in the general population. It was relatively infrequent for veterans to be covered by public insurance, such as Medicare and Medicaid, except for disabled veterans, who were considerably more likely to be covered by such public programs and much less likely than other veterans to have private health insurance. When comparing insurance coverage for veterans with men in the general population on the basis of color, education, and region of residence, a greater percentage of veterans were found to be insured. However, for both veterans and nonveterans, highly educated men were more likely to have health insurance; white men were more likely to be insured than all others; and higher percentages of men had insurance in the Northeast and North Central regions of the country than in the South and the West.

**NHCES Data Preview 5: Charges and Sources of Payment for Visits to Physician Offices.** The mean charge for a physician office visit during the first quarter of 1977 was $21.29. Of this, an average proportion of 0.69, or $14.69, was paid by the patient or his family. Private health insurance paid an average proportion of 0.16, Medicare 0.04, and Medicaid 0.07, with the remainder being paid by other public sources. Among age groups, the average cost of an office visit

was lowest for children 5 years or younger ($14.62). As patients' education level rose, so did the average cost of a doctor's visit, ranging from a high of $28.10 for persons with 16 or more years of education to $18.91 for persons with 11 years or less. Urban dwellers were charged more for a doctor's office visit than residents of rural areas. Charges also varied by geographical region, with highest charges found in the West ($28.01). Residents of the North Central region paid $18.08, the Northeast $21.02, and the South $20.39. The average charge for an office visit did not significantly differ according to sex or racial group.

**NHCES Data Preview 6: Waiting Times in Different Medical Settings: Appointment Waits and Office Waits.** In early 1977 the average wait for an appointment in ambulatory care settings was seven days. The waiting time for an appointment for all types of services was longer in hospital outpatient departments (10.1 days) than in physician offices (6.9 days). For visits associated with preventive services such as prenatal and postnatal care or eye examinations, the wait was much longer, averaging 14.1 days for visits in a doctor's office. Waiting times were shortest for children less than six years old. Generally, females waited longer than males for an appointment (7.8 days compared to 5.9 days), and whites waited longer than other racial groups (7.2 days, white; 5.3 days, all others). Persons living in urban areas waited roughly one day longer to see a doctor than rural residents. In the first quarter of 1977, patients waited an average of 31 minutes to see a physician in all care settings. The average waiting time in a doctor's office was 29 minutes, in a hospital outpatient department 45 minutes, and in a hospital emergency room 38 minutes. While little difference was noted in waiting times across age groups or by sex, a significant difference was found between whites and other racial groups: whites waited an average of 28 minutes in the doctor's office compared to an average of 40 minutes for all other groups. This disparity was even more pronounced in hospital outpatient departments where whites waited an average of 41 minutes and others 61 minutes.

**NHCES Data Preview 7: Employer and Employee Expenditures for Private Health Insurance.** Although 88.3 percent of American employees worked for organizations that offered some form of health insurance plan, the availability of the plan and the employee's share of the premium burden varied considerably, depending on the size of the firm, its union status, and the percentage of low-wage employees on the payroll. Larger firms and those with union contracts were more likely to offer health insurance plans to their employees and to assume a greater share of the premium cost. However, in organizations where more than half of the workforce earned low or minimum wages, 30.7 percent of the workers -- almost three times the national average -- could not obtain health insurance through their jobs. Also, low or minimum-wage workers were least likely to be eligible for health insurance plans that were offered on the job.

**NHCES Data Preview 8: Dental Services: Use, Expenditures, and Sources of Payment.** About 60 percent of the American people do not see the dentist every year. But nearly 8 million people do, and their dental care costs total more than $12 billion annually. The family pays about three-quarters of these costs out-of-pocket, making dental services one of the family's most expensive types of health care. Not surprisingly, children see the dentist most often, with half of those between six and 18 having at least one dental visit during the year. Whites see the dentist more often than minorities. Nearly half of all whites see the dentist at least once during the year, compared to 23 percent of blacks and 30 percent of Hispanics. Family income and education also make a difference. Individuals in families earning more than $20,000 annually are 20 percent more likely to have a dental visit than people whose families make less than $12,000. Nearly two-thirds of those in families headed by a person with 16 or more years of education obtain dental care during the year, compared to only a fourth of those in families headed by someone with fewer than nine years of schooling. The family's share of dental care costs varies considerably by age. The family pays the lowest share (60.2 percent) for children under six, but about 90 percent of annual expenses incurred by the elderly. Sources of payment also vary according to racial and ethnic background. Private health insurance assumes a relatively large share of dental care costs for blacks--29.3 percent compared to 16.1 percent for Hispanics, and 18.2 percent for whites. Medicaid pays for roughly a tenth of annual dental care expenditures for minorities, but less than two percent for whites.

**NHCES Data Preview 9: Prescribed Medicines: Use, Expenditures, and Sources of Payment.** About 60 percent of the American people, or about 120 million individuals, obtain a prescription medicine each year. The medicines--drugs, ointments, refills, and other items prescribed by a doctor--are used most by the elderly, who average slightly more than 14 during the year. Those between 55 and 64 average nearly 12, people 25 to 54 obtain about seven, and those 18 or younger average around four, counting only those who obtained at least one prescription item during the year. Prescribed medicines cost an average of $6.24 each in 1977, with total expenditures reaching $5.5 billion. Nearly three-quarters of those total costs are paid by the family out-of-pocket, with private insurance paying about 12 percent, Medicaid nearly eight percent, and other sources about six percent. Study results show that overall expenditures for prescribed medicines are highest for the elderly, who incur the highest average annual expenses as well as the most out-of-pocket costs. For example, each person 65 or older spent about $93 in 1977 on prescribed medicines--about 15 percent more than those in the second-highest expenditures group and nearly five times more than those 18 or younger. Nearly half of the 10 million people with out-of-pocket expenses exceeding $100 are 65 or older. Females are more likely than males to obtain prescription medicines, have higher rates of use, and higher mean annual expenses for the medicines. The family pays a higher share of prescribed medicine costs among whites than non-whites. Private insurance pays about 15 percent of whites' average annual expenses for prescribed medicines, but less than seven percent of them for blacks and Hispanics.

However, Medicaid picks up about 25 percent of annual prescribed medicine expenses for blacks and Hispanics, or about five times the share for whites. Annual expenses and sources of payment also vary slightly among geographic regions. Mean annual expenses are highest in the South, where private health insurance contributes least to such expenses. Families in the West pay slightly less than the national average for prescribed medicine costs.

**NHCES Instruments and Procedures 1: NMCES Household Interview Instruments.** This report reproduces and discusses the questionnaires used in collecting data in the household portion of the National Medical Care Expenditure Survey (NMCES). The bulk of the report focuses on the core questionnaire, the main data collection instrument for the survey, which covered such areas as disability days, the use of various types of health services, and associated charges and sources of payment for those services. Also included are supplements to the core questionnaire, related survey control and summary forms, and other kinds of instruments used in obtaining data from the 14,000 participating households. Of particular interest are the sections in the report describing the structure of the household interviews, the location of specific groups of questions in the various instruments, and the types of data collected for each instrument during one of the six rounds of interviews. These sections explain the reasons for survey design, and relate specific items in the instruments to the information requirements of the National Health Care Expenditures Study, for which NMCES was the data-gathering component.

**NHCES Instruments and Procedures 2: Estimation and Sampling Variances in the Household Survey.** This report explains the sample design and associated methods of variance estimation for the household portion of the National Medical Care Expenditure Survey (NMCES). The first part focuses on how participants were selected through two independent, four-stage probability samples of the civilian, non-institutionalized population. Emphasis is placed in the second portion of the report on the sampling weights. Sample estimation for the household portion of NMCES was designed to give disproportionately greater representation to families lacking health insurance. Because this design was not self-weighting, particular importance was placed on the development of appropriate sampling weights. The new report describes how those sampling weights reflected the expected number of units in the survey population accounted for by each sampling unit, multiplied by a number of adjustment factors. These included compensation for nonresponse, post-stratification and for the combination of samples. Estimation equations are detailed, and problems of variance estimation from complex sample survey designs are discussed in terms of NMCES. Several alternative variance estimators are reviewed, such as the Taylor series linearization method, and the use of fitted relative variance curves is described.

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